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EDITORIAL

A PLEA FOR SANE THINKING

There appears a growing tendency amongst medical students, and even it seems, amongst some graduates, to allow themselves to get further and further away from the foundations of medical thought. The treatment of disease is frequently pushed into the background, to be replaced by the latest theory coming from the presses of the medical periodicals.

One sees the average medical student being floated higher and higher on a frothy surfeit of knowledge, blown hither and yon by the latest advances of the "literature", his feet vainly paddling out of reach of the shore. No longer is a text-book a treasured possession, a valued guide and life-long friend, but merely a means to an end, considered out-dated and old-fashioned if more than a year old.

We do not deny the value of medical research, but we do deplore the ever-widening gap that appears between the student's pre-clinical studies and his work in the hospital years. This "passive" forgetting of the three foundation stones of medical science, Anatomy, Physiology and Pathology, leads to the situation where new work is not critically examined and assessed on the basis of our knowledge of the basic sciences. We tend to forget that disease does not change, but only our knowledge of it, and we loose our ability to carefully and impartially consider the latest researches and to allot them their proper position in medical

knowledge. There results the greatest confusion of ideas, in which the beacon lights of basic facts grow dim and are lost.

This is not entirely the fault of the student; the pressure of work and extra-curricular affairs of undergraduate life, particularly in these troublous days of a shortened course and a reduced Faculty, leaves little time for the contemplation we believe so essential for an understanding of our work. Knowledge is swallowed in large lumps, often with no pause for sane consideration of its significance. Fact and phantasy are inextricably mixed and accepted as the one and only truth. This can lead only in one direction: to a situation where doctors will be guilty of accepting and believing half truths and distortions of fact such as we see dispensed by the "digest" form of periodical.

Our Dean tells us we should study Surgery from three text books: a text of Anatomy, a text of Physiology, and a text of Pathology. This advice applies *mutatis mutandi* to the study of Medicine, Paediatrics, Obstetrics, or to any branch of Medical Science. Only by earnest application of this advice, which should be a foremost principal of our medical lives, can we achieve a real basis for the healing of the sick.

Obituaries

DAVID EDWIN ROBERTSON, M.D., F.R.C.S.(C)

On February 19th, 1944, death removed from this Faculty, David Edwin Robertson, M.D., F.R.C.S.(C), Surgeon-in-Chief, Hospital for Sick Children and Assistant Professor of Surgery, University of Toronto.

In many ways he was an ideal professor. He seemed to have that combination of attractive personality, infectious enthusiasm quickly communicated to those about him and a shrewd common sense that attracted both colleagues and students to him. He was one of those rare individuals who in spite of the passage of years do not grow old and who constantly recall by action and word the promise of the days of their youth.

He entered this Faculty in 1902 from Harbord Collegiate and at once entered into the whole life of the School. Not only was he an enthusiastic student but he achieved distinction as a brilliant centre forward on the Varsity Junior Hockey Team and as a third base man on the baseball team. Unfortunately he contracted a cold which led to a pleurisy and this forced him to drop out of Medicine for a year. His subsequent career may well be considered by students who in the early years of their course develop serious illness and who may too easily assume that a full life is impossible for them.

He graduated in 1907 and spent two years as intern in Toronto General Hospital. Here he came in contact with Dr. F. N. G. Starr and Dr. A. Primrose, who aroused in him an active interest in Surgery and probably influenced him to continue its study. While there he also worked with Dr. George W. Ross, just returned from Sir Almroth Wright's laboratories with the new theories and techniques on opsonins, and from him obtained an introduction to original investigation which influenced his whole professional life. To Dr. J. J. MacKenzie, too, he owed a liking for pathology which had much to do with his subsequent success in Surgery.

Determined finally on a surgical career he showed his independence of mind by planning a course quite different from that which was considered correct in those days. Instead of going to London and settling down under a tutor to prepare for the primary and final examinations for Fellowship in the Royal College of Surgeons of England, he went to Berlin and joined the service of the brilliant pathologist, Pick. At the same time he acquired a working knowledge of German and followed the clinics of von Bergmann and von Schmieden in Surgery. After some months in London and New York he returned to Toronto just in time to receive an appointment in the re-organizing surgical staff of the Hospital for Sick Children, under Professor C. L. Starr.

While Professor Robertson rapidly became a skilful operator and able diagnostician, the practice of surgery meant more to him than simple craftsmanship. As each of the great advances have been made in the art of surgery in these forty years he has shown active interest and keen enthusiasm to see and to try all that seemed new and good. With the revival of interest in the transplantation of bone he at once engaged in a long series of experiments on animals which resulted in definite contributions to our knowledge of

this important branch of surgery. Much of his success in the orthopaedic surgery of the Children's Hospital and Christie Street is based on these youthful studies. Similarly he took great interest both in the laboratory and the hospital in the researches of Hartwell and Hoguet and of Whipple, Burnheim and Stone on intestinal obstruction, and this interest which was aroused so many years ago bore fruit ultimately in his enthusiastic adoption of the principles suggested later by Wangensteen and Abbott. In his own last illness there is no doubt that his life was greatly prolonged and made more comfortable by the use of the Miller Abbott tube. It was a revelation to his medical attendants to see the keen scientific interest he took in observing on himself the effect of the treatment that he had advocated for others.

In later years he found great interest in the new surgery of the chest and had considerable success in the treatment of bronchiectasis by lobectomy and of patent ductus arteriosis by ligation. His greatest enthusiasm, however, centred on ramisection and sympathetic ganglionectomy as advocated by Royle. At the time of his death he was engaged in completing a study of the treatment of acute osteomyelitis by the sulfonamides and penicillin and was as full as ever of enthusiasm and hope that by these new measures this scourge of childhood might be subdued.

Of the spectacular incidents in his life, little need be said here, as the facts are all well known. It might be well to recall to young Medical Officers about to go overseas, however, that this distinguished surgeon found great joy and opportunity for service as the M.O. of the First Canadian Battalion; that the practice of surgery and the teaching of it are not incompatible with the exercise of keen business acumen as has been demonstrated in the leading part he took in the organization and management of the Medical Arts Building; and that courage and resourcefulness as shewn in the black solitude of the Moose River Mine are qualities that may well attract the emulation of us all.

W. E. GALLIE.

ALEXANDER PRIMROSE, 1861-1944

In the passing of Dr. Alexander Primrose, in the Toronto General Hospital on February 8, 1944, the medical profession lost a cultured gentleman, a gifted scholar, and a distinguished surgeon.

Dr. Primrose belonged to the era of surgery where Listerian principles were introduced, contributing so much to the development of surgery. It was Dr. Primrose's rare privilege to live his professional life in an era where timid surgical procedure developed into boldly-planned, complicated operations, carried out in all the anatomical sites of the human body.

My first contact with Dr. Primrose was as Professor of Anatomy, a post which he held in this University from 1896 to 1907. He had the rare gift of being able to impart his enthusiasm for anatomy to the student body. Under his guidance the study of anatomy became a delightful challenge. His ability to draw anatomic diagrams, using both hands simultaneously, further added lustre to his teaching. Our year was the last which was privileged

to attend his course in a "lightning review" of anatomy. He covered the high lights of human anatomy in twelve lectures, to which all were welcome. They were conducted between five and six o'clock in the afternoon. The lecture room was always crowded. The picture of Dr. Primrose lecturing while continuously drawing diagrams with both hands and being followed by "George", the anatomical laboratory attendant, keeping a clean space on the black-board for the next diagram, still lingers as one of the real inspirations of my undergraduate days.

During the years when Dr. Primrose was Professor of Anatomy he was also in active surgical practice, ultimately holding the post of Professor of Clinical Surgery from 1918 to 1931. His achievements in surgery were recognized internationally. He held fellowships in the Royal College of Surgeons of England and Canada. He was a Fellow of the American College of Surgeons. He was also elected President of the American Surgical Association, a post which represents the highest honour which his surgical colleagues on this continent could bestow. While Dr. Primrose achieved such eminence as a surgeon, his interests were not limited by his surgical practice. In the broad field of education, and particularly in medical education, his influence was great. Through the Canadian Medical Association, of which body he was a one-time President, he made a contribution to Canadian medicine which was of inestimable value. His Alma Mater, the University of Edinburgh, conferred on him the degree of Doctor of Laws, which he regarded as one of the greatest rewards of his life.

Dr. Primrose had a unique capacity for friendship. His friends were not only of his own generation. His keen sense of humour and his refreshing and youthful approach to the daily problems endeared him to the younger members of the profession. To us he epitomized the achievements of a full and well-balanced career so much to be desired.

His interest in sport was maintained to the end of his life. At his summer home "Dawamah" on Lake Joseph, Muskoka, he was keenly interested in sailing, and did much to stimulate dinghy racing prior to the war. His joy in golf enabled him to keep physically fit during the summer. In the winter this gave place to English billiards, a game he played with no mean skill.

To have had Dr. Primrose as a teacher, as a friend, and as a colleague on the Faculty, was a rare privilege. His example and precept will continue to exert a stimulating influence on the succeeding generation of students, pointing a way of life which even in these days of changing standards will bring a rich reward.

R. R. Graham.

PROFESSOR W. H. MARTIN, M.A., Ph.D., F.R.S.C.

William Howard Martin will be remembered by thousands of graduates of the University of Toronto and especially by the graduates in the Faculty of Medicine of the last twenty years. Their memory will be a very kindly one—a memory of clear and inspiring lectures on chemistry, of sympathetic guidance in the laboratory and of wise and friendly advice on the difficulties that beset students in the first and second years of their course, but above all, a memory of an upright and large-hearted man.

Professor Martin died on February 22nd, 1944, at the age of 54. For many years his early death was known to himself and his nearest associates to be inevitable but the very cheerfulness and courage with which he carried on his duties to within a few weeks of the end left his friends unprepared for the grievous shock of the suddenness of his passing.

Martin was a born teacher and one of great experience. After several years teaching in collegiate institutes he was appointed to the staff of chemistry at the University of Toronto in 1919, and in 1939 had risen to the position of Professor of Chemistry. He found time for much research work in physical chemistry and published a large number of articles on light scattering and Raman effect. His first paper appeared in 1920 and the last shortly before his death. He wrote the text book now authorized for Middle School pupils in Ontario in which he gave a remarkably clear and logical presentation of elementary chemistry.

His clear mind and sound judgment were of great value on University committees and councils and the same qualities were reflected in his activities associated with the Canadian Institute of Chemistry, the Royal Canadian Institute and the Ontario Department of Education where his advice was always respected.

F. B. KENRICK.

SHOCK THERAPY IN PSYCHIATRY

RONALD M. BREMNER, 4T5

Shock therapy is the term used to include the various forms of drastic treatment of certain mental disorders. There are two groups of therapy included in the term:

1—insulin shock;

2—convulsive shock, by means of metrazol or electric current.

The use of such therapies which are capable of bringing about psychic alterations is still empirical. The treatment is not specific, and is not of itself a cure. The chief value is in enabling psychotherapeutic contact with the patient.

Other methods producing profound clinical, physiological and metabolic reactions—such as artificial fever, prolonged sleep, carbon dioxide inhalation, aseptic meningitis—are just as much entitled to be described as shock therapy; but the term is rarely used to include these methods.

Part I

The three methods of shock therapy in general use at the present time are insulin shock, metrazol convulsive shock and electric convulsive shock. Of these, insulin takes precedence chronologically, and so we will confine our attention at present to this form of treatment.

Insulin Shock Therapy

Indications

Insulin shock therapy is the method of choice among the drastic therapies for the treatment of schizophrenia. As regards the types of psychosis—(1) katatonic, (2) paranoid, (3) hebephrenic, (4) simple, the prognosis is favourable in the order named.

History

As with most new therapies, so too in shock therapy, there was a forewarning of some such development. Disease and trauma, which caused a disturbance of the body's normal physiological equilibrium, had long ago been observed to alleviate mental symptoms. Acute psychological changes were known to result from changes in oxygen tension; and experimentally, high concentrations of CO_2 had produced temporary, though beneficial results in catatonic stupors.

Steck, in Switzerland, actually used moderate doses of insulin to treat various psychotic states. Insulin was also given to patients who refused to eat, and some observers reported success in this effort, but also noted psychological improvement after the insulin administration. Thus far the aim was to alleviate a symptom, and there was no intention of influencing the psychosis as such. Moderate doses were administered, and shock symptoms were avoided.

When Sakel, in 1928, gave to drug addicts doses of insulin sufficient to produce hypoglycemic states, he unintentionally caused severe hypoglycemic shock, and observed remarkable mental changes following the severe shock in certain cases. These successful results led Sakel "to use severe hypoglycemic states as an etiologically nonspecific (though clinically specific) treatment for psychoses." He continued this research, and deliberately produced dangerous hypoglycemic states, upon the assumption that such therapy would remedy the psychosis itself.

Sakel introduced the treatment in Vienna in 1933, and published his first results less than ten years ago. In 1935, Müller applied it to a large number of selected cases at Münsinger, Switzerland, and at this same center in May 1937, the first extensive survey and summary of the

new therapy was presented to the meeting of the Swiss Psychiatric Association.

The use of insulin shock therapy in England and America dates from 1936, and was first reported to the American Psychiatric Association in 1937.

There has since been a period of extensive clinical trial throughout the world, and the technique has been elaborated and perfected. Aside from the therapeutic aspect, the treatment of psychoses with insulin has produced much research in the psychological and physiological problem of schizophrenia, and it has reaffirmed the psychosomatic viewpoint in psychiatry.

Contra-Indications

1—Various Cardio-vascular Conditions
arrhythmia due to organic disease of the conduction system;
coronary sclerosis or occlusion;
angina pectoris;
valvular disease;
myocarditis;
essential hypertension.
2—Tuberculosis.
3—Organic Impairment of liver, renal or pancreatic functions.
4—Severe Endocrine Dysfunction
pituitary disease;
Graves' disease.

Technique

Insulin shock therapy is a highly specialized procedure requiring study and experience before its administration to patients is attempted. It should be given only in a hospital unit in charge of a trained physician, adequately staffed with nurses and equipped with facilities to meet any emergency.

The treatment is begun with small doses which are increased fairly rapidly until the shock level dosage is attained. Unless it becomes advisable to introduce modifications, the shock dosage is continued for fifty to eighty days. Usually there is one treatment-free day each week. If no improvement is evident at the end of the third month, insulin therapy is considered as unpromising.

Preparation

The treatment should be discussed with the patient's relatives, who are informed of possible results and risks. It is wise to secure a written agreement before undertaking this drastic therapy.

A thorough physical examination of the patient is conducted, with special attention to the heart and circulatory system. Electrocardiographic examination is requisite. The patient is informed that he is to have this special treatment, and his attitude is evaluated to make use of it in a psychotherapeutic approach. Special instruction is given the nurses who are to assist in the therapy. Mention is made beforehand of special symptoms which must immediately be called to the physician's attention, with emphasis on the possibility of delayed shock after the treatment.

The hospital room should be at a warm, even temperature, and well ventilated, because the patient perspires abundantly and body temperature changes during hypoglycemia. Since the patient may easily roll out of bed, a canvas or restraining sheet is used. It need only be applied as soon as the patient becomes overactive. All cases must be watched from the time of the insulin injection until they are fully awake. Each patient's treatment should be recorded under the following headings: time, temperature, pulse, respirations, medications, weight (once a week), nourishment and observations of behaviour and other reactions.

Definition of Various Terms

In our present sense, *hypoglycemia* is the term used to designate the condition

of the patient during the time between injection of insulin and administration of carbohydrate. The clinical symptoms of this condition are characteristic and develop in a specific succession. Increase of the dose speeds their appearance, decrease of the dose retards their progression, but the dose does not influence the sequence of the symptoms. *Shock*, by definition, is present when the patient in hypoglycemia is unconscious—out of contact with the outer world and unable to respond adequately to voice or touch. *Coma* is the term for deep unconsciousness during which no responses can be elicited and most reflexes are lost. The disappearance of the corneal reflex indicates that the border of reversible change has been reached.

Phases of Insulin Shock Therapy

According to Sakel, there are four phases of insulin shock therapy.

1—the preparatory phase, in which increasing doses of insulin are administered.

2—the shock phase, characterized by a shock on each treatment day.

3—in which frequent rest days are introduced.

4—where small doses of insulin are given, and the hypoglycemia is interrupted early.

Phases 3 and 4 are being used less and less, and a course of treatment now consists of phases 1 and 2 only. However, one or two rest days are given at the time of the menstrual period or when the patient is exhausted from an epileptic seizure or severe coma.

Procedure of Treatment

Phase 1—The Preparatory Phase

Six times a week, ordinary (not protamine zinc) insulin is given to the fasting patient early in the morning. The injection may be given by a nurse and must be placed deep in the gluteal musculature, since an insulin depot within the subcutaneous fat may lead to a focal necrosis. When the insulin is injected intramuscularly, an average period of 45 minutes elapses before signs of hypoglycemia appear. The shortest latent period observed has been 20 minutes.

The initial dose is 15 units of insulin. The dosage is increased daily by 10 units until signs of hypoglycemia appear, following which the dosage is raised 5 units daily. During this phase, the daily treatments are terminated 4 to 4½ hours after the injection of insulin by urging the patient to drink a warmed dilute sugar solution given in weak tea or fruit juice. The patient is able to drink, but if he refuses, the solution must be given by nasal tube. After this termination, the patient is served his breakfast. Occasionally, after the patient has taken the sugar solution, an increase in hypoglycemic symptoms appears, probably the result of a spontaneous output of body insulin due to stimulation by the sugar intake. Because of this, the patient is closely observed for at least 30 minutes following the ingestion of glucose.

Phase 2—The Shock Phase

This phase is reached when the patient loses consciousness during the third hour. When this is accomplished, the insulin dosage is kept stationary. The proper dosage depends on two factors—

1—the patient's susceptibility to insulin, which is variable and may even change during the treatment, and

2—the desired depth of coma.

The development of the clinical picture is the guide for the dosage; it is not the effect of insulin on the blood sugar level which is therapeutically important. Form-

erly the amount of insulin given to reach a shock dosage was unlimited, but now, if possible, it is rare to give more than 200 units. VonBraunmühl has instituted a plan of alternating insulin dosage which is usually successful in overcoming insulin resistance.

Exclusive of the determination of proper dosage, the most important technical problem is that of the suitable time for interruption of treatment. All insulin treatment in this phase becomes dangerous after the third hour, and it is a general rule that the actual coma should never last longer than three-quarters of an hour. The point of termination depends upon both medical considerations and the psychotic condition of the patient. In most cases it is preferable to interrupt the treatment immediately after any convulsion has occurred.

The treatment is always terminated by intake of sugar. The use of adrenalin for this purpose has been utterly abandoned. During this phase, the patient is unable to swallow fluids, and so termination is by nasal tube, or intravenously if necessary. Intravenous glucose alone is insufficient, and the patient must be given additional sugar by mouth within half an hour. Following the feeding by stomach tube, the patient awakens gradually within 10 to 30 minutes. If termination is by intravenous means, the awakening is sudden, usually while the needle is still in the vein. In any case, but more so after the stomach tube termination, there is a surprisingly changed attitude of the patient on awakening. However, this usually lasts less than half an hour, and the patient returns to his habitual manner.

Modifications

There are various modifications of the outlined therapy, most of which tend either to decrease the dangers, or to increase the drastic aspect of the shock treatment.

COMPLICATIONS

During Treatment

A—Local Irritation may occur after prolonged injection of insulin into the same spot, and so it is advisable to change the location with each injection.

B—Allergic Reactions are infrequent with this therapy, but if they occur, they are usually generalized manifestations. The treatment is discontinued until such reactions have subsided, and then therapy is resumed using insulin from another source.

C—Cardiovascular Disturbances. Irregularity of rate and rhythm is usual during the treatment, but is minor and transient. More serious conditions, such as auricular fibrillation, gallop rhythm, heart failure and circulatory collapse, have occurred. Thus, careful selection of patients before therapy is instituted is of utmost importance.

D—Respiratory Disturbances include

1—aspiration, due to loss of reflexes during coma.

2—laryngospasm, coincident with the tonic spasm of other muscles.

3—central respiratory failure, which is the most dreaded complication, and

4—pulmonary edema, which is fairly frequent.

E—Various C. N. S. Disorders may occur, and include aphasia, hemiparesis and a few vascular disturbances. Mental Disturbances, such as hunger excitement, are uncommon, but epileptiform seizures often occur during the first two hours of treatment.

F—Fractures and Dislocations and Laceration of the Tongue during convulsions are rare in insulin therapy.

On Termination

The chief complication is vomiting, which usually responds to atropine or chloroform. If it is habitual and does not respond, the insulin dosage is changed.

After Termination

A—The transitory *recurrence of hypoglycemic shock symptoms after sugar intake* has already been mentioned. It is not of great pathological significance.

B—Some patients do not awaken after a tube feeding, in which case intravenous glucose must be given. If this also fails to rouse the patient, the condition is serious, and is called *prolonged or protracted coma.* This is probably due to cerebral damage which prohibits utilization of carbohydrate. The condition is frequently fatal (25% of cases); but if recovery occurs, there is often dramatic improvement in the patient's mental state. The only therapy is to keep the blood sugar normal.

C—*Fever* of 100 to 103 degrees in the afternoon or evening is a common but minor complication of this therapy. Insulin treatment should be omitted until the fever subsides.

D—*Delayed Hypoglycemia* or "After-Shock" may occur. This is the reappearance of hypoglycemic symptoms several hours after the patient has been completely aroused from his treatment. This is readily treated by administration of glucose, but its possibility requires the continual vigilance of the nursing staff.

Convulsive Shock Therapies

Indications

Indications are the same for metrazol or electric current. Metrazol convulsive therapy was originally proposed for schizophrenia, but the method has been all but abandoned for the various forms of this disorder. The use of convulsive shock therapy is now almost confined to selected cases showing a depressive psychosis—both manic-depressive types and involutional melancholia.

History

In 1781 there was reported from London a case af mania which improved following convulsions induced by the administration of large amounts of camphor given to cause rest. Other sources in the 18th century also reported upon the beneficial effects of convulsion on mental disorder. In 1930 it was recognized that spontaneous convulsions occurring in catatonic schizophrenic patients were followed by a prompt remission. These observations, and his belief that an association between epilepsy and schizophrenia is extremely rare, led vonMeduna to treat mental disorders by artificially produced convulsions in 1933. He first used camphor intramuscularly, but this proved unsuitable due to complications, and its use as a convulsant was discontinued. Metrazol, a synthetic product with similar pharmacologic effects to camphor, was then tested, and its use have proven extremely successful.

Electricity as a method of producing convulsions must only be considered as a modification in technique, with no new logic or concept. Several workers of the 19th and early 20th centuries used electroshock in the treatment of mental disorders with favourable results; but it is to Cerletti and Bini in Italy that the credit goes for pioneering electroshock as a convulsant in the therapy of mental diseases in 1937. This form of shock therapy was soon adopted in Europe and America, and has found wide application because of the known disadvantages of the drug methods. Within the last two years it has come into use in Ontario mental institutions.

Contraindications

1—Cardiovascular disease, whether arteriosclerotic, hypertensive or inflammatory;
2—Tuberculosis; sero-positive syphilis;
3—Febrile conditions; cachexia;
4—Abnormalities of blood or urinary constituents;
5—Exophthalmic goiter;
6—Pregnancy and menstruation;
7—Bone disease, and the presence or history of skull fracture.

Technique

METRAZOL CONVULSIVE THERAPY

Preparation

The same precautions and preparations as in insulin shock therapy are undertaken in this method, as well as others to be mentioned. Special attention is given to the patient's bony structure and spinal x-rays are advisable. Administration of vitamins and calcium is advocated. Sedation and nourishment are avoided for several hours before the injection. Dental plates must be removed. To reduce the risk of vertebral fracture, it is a common practice to hyperextend the patient's spine by placing a pillow or sand-bag behind the lower thoracic vertebrae.

Procedure of Treatment

A 10% aqueous solution of metrazol is universally used. The initial dose of 3 to 5 cc. is injected intravenously with a large-bored needle as rapidly as possible. If no convulsion occurs within a minute, the injection is repeated with 1 cc. more than the original amount given. If again there is no resulting seizure, further attempts are not made, and the treatment is resumed the following day with 1 cc. more than the last dose. This procedure is continued until a convulsion results. However, it is undesirable to exceed a single dose of 15 cc. Immediately following an injection, the attendants apply firm pressure and fixation to the patient's trunk and limbs as a precaution against fracture and dislocation. The convulsion invariably starts with a wide opening of the mouth, at which moment an absorbent cylindrical gag is inserted. The seizure, which is almost identical with a grand mal epileptic fit, begins 5 to 15 seconds after the injection and last 30 to 60 seconds. Within 15 minutes to one hour, the patient is sufficiently awake to take a meal. The patient should remain in bed for 6 hours after the convulsion.

The treatment is repeated at variable intervals of days. At least two convulsions a week are recommended, but it is advisable to use the patient's mental condition as the determinant of the frequency of treatment. In repeating metrazol injection, it is usually necessary to increase the dosage by less than 1 cc., but if a seizure is unusually severe or prolonged, the subsequent dose must not be increased. As a rule, about 15 seizures are induced before the treatment is abandoned as unpromising. In responding patients, the treatment is continued until maximum improvement or remission is observed, and treatment is not prolonged if the clinical picture is satisfactory.

Modifications

Many modifications have been suggested. These are usually concerned with overcoming the anxiety and painful memories associated with the treatment, and with eliminating the hazards of fractures. In selected cases, combination of the hypoglycemic and convulsive measures have been attempted.

ELECTROSHOCK CONVULSIVE THERAPY

There are two methods in use at the present time, one of which employs alternating current and produces immediate

unconsciousness in the patient; the other uses faradic shock and causes no loss of consciousness.

The Alternating Current Method produces a convulsion by the application of a known potential difference between the fronto-temporal regions for a known period of time. The apparatus employed are of numerous types, and new apparatus is continually being placed on the market. Present lack of knowledge has hindered the standardization of electrical shock therapy; but fundamentally, the apparatus consists of a system of electrodes by which the current is applied to the head, and a control device by which electrical characteristics of the situation are determined and manipulated.

The preparation of the patient is similar to that in metrazol convulsive therapy, except that the gag is placed in position before the application of current. Hair pins and other metal objects must be removed from the head. Two electrodes — about two inches square — are placed in position bilaterally in the fronto-temporal regions, slightly above and anterior to the ears. Electrode jelly is used to insure contact, and a broad rubber band is placed around the head to hold these electrodes in place. The convulsive threshold cannot be predicted, and so treatment is begun arbitrarily with a voltage of 60 and the timer set at 1/10 second. When the current is passed, there may be (1) no convulsion, (2) an abortive fit, or (3) a major convulsion. If there is no seizure the stimulus is increased in voltage and reapplied 10 or 15 seconds later. At least 250 milliamperes of current are required to produce a convulsion —but less than 10% of this actually reaches the brain. It is essential to produce a seizure at the first treatment. In the usual successful case, the current of 300 to 700 milliamperes, with a potential of 80 to 120 volts is passed for a period of 1/10 of a second. The major fit is a typical epileptic one. It occurs within one minute of passage of the current, although consciousness is lost instantly, and lasts less than one minute, following which consciousness gradually returns.

In the Faradic Shock Methods a current of about ten milliamperes is passed between two electrodes, one on the forehead, the other on the neck. Fifteen shocks, each of approximately ½ second duration, are given at intervals of ½ second. Immediately after this series of shocks, barbiturate is injected intravenuosly.

Electroconvulsive treatment is usually not given oftener than three times a week for 3 or 4 weeks. The maximum improvement usually appears with 36 hours after the shock, and the decision upon the advisability of another treatment is guided by the extent of the improvement and its apparent permanency.

Complications

Complications are the same in both types of convulsive therapy, and are nearly all avoidable if proper preparations and contraindications are observed.

Pulmonary complications are quite infrequent.

Vomiting during or after the convulsion does occur but is not common.

Cardiovascular Disturbances, usually arrhythmia, are generally transient.

C.N.S. Disorders. Status epilepticus occurs rarely. Memory defects are frequent, but usually minor and transitory.

Skeletal Complications are the most frequent and serious complications of convulsive therapy. Fracture, the commonest being in the thoracic spine and the neck of the femur, and dislocations, the commonest being that of the jaw, re-

sult from the violence of muscular contraction during the seizure. Such complications are usually avoidable if proper hyperextension of the spine and fixation of the shoulders and hips are secured. Recently, curare and erythroidin have been widely used to diminish this muscular activity during the convulsions. These drugs minimize the danger of fracture and permit application of this therapy to mental cases who would be deprived of it because of a skeletal defect.

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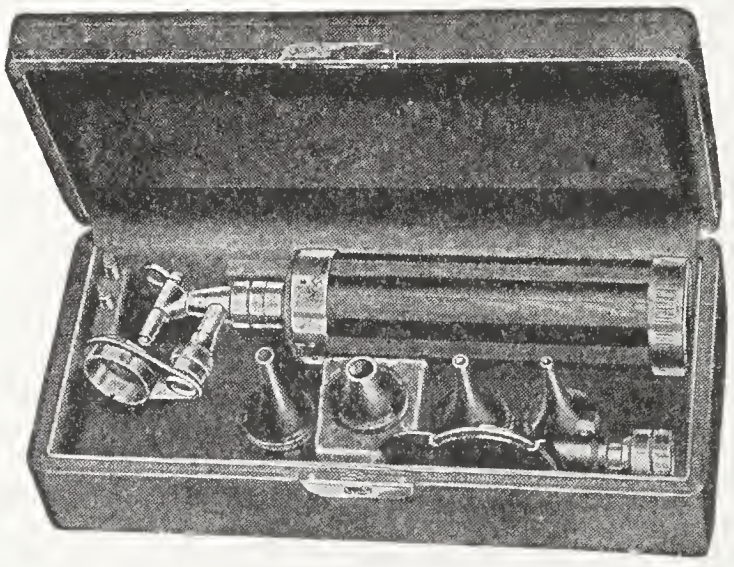

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INTESTINAL OBSTRUCTIONS

HENRY LOEB, 4T4

Definition

Intestinal Obstruction is the condition in which there is interference to the natural onward passage of the intestinal contents. The occlusion may develop suddenly or slowly and any part of the small or large bowel may be affected. The term "Intestinal Obstruction" is usually used to denote an obstruction of mechanical origin—although obstructions of paralytic and mechanical origins should be included.

General Statement

Intestinal Obstruction is one of the most common bowel disorders. It is always serious, partly because of the local lesion and partly because of the profound systemic effects. Diagnosis is often difficult and in the acute types, prompt surgery is usually necessary if life is to be saved. External strangulated hernia, intussusception and adhesions are the most frequently observed causes of intestinal obstruction in this country.

Etiology and Classification

Intestinal Obstruction may be divided into three main groups:

1.—Mechanical;
2.—Nervous Imbalance;
3.—Vascular Occlusion.

I. Mechanical Obstruction.

A—*Causes outside the bowel.*

(*i*) *Herniation*—This may be internal or external and is often associated with strangulation of the involved loop of bowel (strangulated hernia). Of the external group, the most common is the fermoral type usually occurring in females and most commonly on the right side. It can also occur in any of the other sites where hernias are found. Internal herniation may occur either through congenital or acquired slits or tears in the mesentery or omentum, or through one of the normal peritoneal fossae, e.g. paraduodenal or retrocaecal fossae.

(*ii*) *Bands and adhesions* — This includes a persistent Meckel's Diverticulum which causes a kinking or twisting of the bowel. Also there may be an obstruction following an inflammation of an abdominal organ, giving rise to an exudate which causes bands and adhesions. Either a diverticulum, a fibrous appendix, or a piece of omentum may cause an obstruction by becoming attached to some part of the abdomen.

(*iii*) *Compression from without by tumors, enlarged lymph glands, etc.*—This occurs particularly at the terminal ileum and in the pelvis, i.e. where the G.I. tract is fixed.

B—*Causes in the wall of the bowel.*

(*i*) *Malignant tumors* — Carcinoma (scirrhous) is the most common. One usually finds a chronic obstruction, and then an acute termination due to an impaction of feces or twisting of a distended coil. Sarcoma may also cause obstruction.

(*ii*) *Benign tumors*—Fibrome, Lipoma, Haemangioma or polyps may cause an obstruction. These may occur in the small or large bowel.

(*iii*) *Congenital structures*—Atresia of small intestine and imperforation of anal canal and rectum rarely cause intestinal obstruction.

(*iv*) *Acquired strictures* — This includes contracting tuberculous scars, luetic scars, and scars caused by other ulcers. A stenosing type of carcinoma, an an-

nular gumma or surgical suture of bowel may cause a stricture.

(*v*) *Inflammatory reaction* — Diverticulitis, which usually occurs in the sigmoid flexure, is the most common inflammatory reaction of the bowel causing intestinal obstruction. In the acute type of diverticulitis the obstruction is due to infection and edema, while in the chronic type, the obstruction is due to hyperplasia, adhesions and angulation.

C—*Causes within the lumen of the bowel.*

(*i*) *Fecal impaction* — This is an example of an acute obstruction following a chronic obstruction.

(*ii*) *Foreign bodies* — These include masses of round worms or swallowed foreign bodies and cause intestinal obstruction only in rare cases.

(*iii*) *Large gall stone*—It may enter the lumen of the bowel through a cholecystoduodenal fistula and usually lodges in the lower ileum.

D—*Intussusception.*

One part of the intestine invaginates into another resulting in an acute obstruction.

E—*Volvulus.*

In this condition we find a torsion or twisting of a coil of bowel on itself around its mesenteric axis (the mesentery is sclerosed due to previous infection). It usually occurs in the sigmoid colon.

2. Obstruction Due to Nervous Imbalance.

A—*Paralytic ileus.*

Paralytic ileus is a paralysis of the muscular walls of the bowel following an abdominal shock, e.g. after an abdominal operation, peritonitis, or injuries to the abdomen. It is associated with pneumonia, fractures, and heart disease.

B—*Spastic ileus.*

The patient in which spastic ileus is diagnosed is invariably neurotic. It simulates a mechanical obstruction and usually affects the colon.

3. Vascular Occlusion (really a paralytic ileus).

A—*Mesenteric thrombosis.*

This occurs secondary to portal obstruction as caused by cirrhosis of the liver and various septic abdominal conditions.

B—*Mesenteric embolism.*

This results when an embolis is dislodged from the heart or aorta and blocks a mesenteric vessel.

C—*Severed vessels.*

Following trauma to the abdomen, vessels are severed interrupting the blood supply to a segment of bowel.

Pathology

In most cases of intestinal obstruction there occur, in addition to obstruction of the lumen, a strangulation of part of the bowel. There is a distinct difference in pathology of acute and chronic intestinal obstruction.

Acute obstruction.

The bowel above the obstruction is distended with fluid and gas, and the wall is intensely congested (varying in colour from a dusky cyanosis to a deep purple). The mucous membrane undergoes necrosis and numerous small ulcers are formed. Bacteria can pass through the wall of the bowel and cause a general peritonitis. Occasionally serous fluid may seep into the peritoneal cavity.

The bowel below the obstruction soon empties and remains pale and contracted.

The wall of the strangulated loop is

purple, thickened and edematous due to engorged blood vessels. Capillary haemorrhages are common and a fibrinous exudate covers the peritoneal coat of the bowel. The blood supply to the strangulated loop is cut off, resulting in a local ischemia which goes on to necrosis and gangrene, and in some cases, to actual perforation of the bowel.

Chronic Obstruction.

Above the stricture the bowel wall is dilated and hypertrophied. Hard fecal masses are formed above the obstruction and these in turn give rise to stercoral ulcers of the mucous membrane.

Below the stricture the bowel is collapsed. Chronic malignant obstruction may at any time become acute owing to inflammatory changes at the sight of the stricture with swelling of the mucous membrane.

Pathological Physiology

In intestinal obstruction there is produced in the body a state of dehydration. This is due to (a) loss of fluids in the vomitus, (b) drainage of large quantities of fluids into the distended bowel proximal to the obstruction. Associated with this dehydration there is a general toxemia. The toxic substance appears to be a proteose or a split-protein product. Taken by and large, the toxemia is more marked the higher up the bowel the obstruction occurs and with large bowel obstruction little or no toxemia is found. In addition to the action of the above poison, various changes in the blood chemistry take place, namely, decrease in chlorides, increase of CO_2 combining power, and a rise in the N.P.N. When saline is administered to the patient these changes do not occur.

The gas in the distended bowel consists mostly of swallowed air, although some of it results from local putrefaction and fermentation and some by diffusion from the blood stream.

A lot of experimental work has been done to determine the cause of death in intestinal obstruction, but it is too extensive to be dealt with in this paper.

Symptoms

The most important symptoms of intestinal obstruction are pain, vomiting and constipation.

(*1*) *Pain* comes on suddenly and early, and is usually severe in character. It is intermittent and colicky, rising to a peak which is maintained for one or two minutes and stopping abruptly, only to return after a short interval of comfort. The pain may at first be referred to the centre of the abdomen but usually localizing later at the site of the obstruction. In partial obstruction the pain is intermittent, while in complete obstruction, it is continuous. With large bowel obstruction the pain comes on insiduously and is irregular in time and character, usually giving continuous cramps. In intussusception, a rhythmic pain is experienced. Occasionally the patient may complain of pain in the shoulder due to irritation of the diaphragmatic peritoneum by fluid that has escaped into the peritoneal cavity.

(*2*) *Vomiting* may commence early due to a reflex mechanism. At the onset only nausea is present, but later, with complete high small bowel obstruction vomiting is frequent and copious. Early in the course of the obstruction, the vomitus consists of stomach contents and may be bile-stained. Later it may be feculent in character and when this occurs there is every reason to believe that there will be a fatal termination.

(*3*) Constipation begins after the first few hours of the obstruction and neither feces nor flatus are passed. At the onset

the bowel distal to the obstruction may empty itself.

Signs

(*1*) *Shock and collapse* in an acutely ill patient (as evidenced by cold and clammy skin, rapid and feeble pulse, and subnormal temperature), signifies a long standing obstruction. Early in the course of the obstruction there may be no evidence that a potentially serious ailment is present, i.e., the pulse rate, temperature, respiratory rate and blood pressure are normal or nearly so.

(*2*) *Peristalsis* may usually be seen in obstruction of long standing, although it is sometimes seen at the onset in thin subjects. Associated with this peristalsis, borborygmi may be heard at the height of a colicky intermittent pain.

(*3*) *Distention,* to a certain degree, is usually in evidence when the patient is first seen. Some tympany may also be present. The distention may come on rapidly or not at all.

(*4*) *Dehydration* is rarely seen in large bowel obstructions, but will surely be found in neglected cases of small bowel obstructions. It comes on surprisingly early and manifests itself by a dry tongue, thirst, small ulceration about the mouth and laxity in the superficial tissues.

(*5*) *Abdominal* tumor, consisting of an infected segment of the intestine, may be palpable through the abdominal wall, per rectum or in one of the hernial orifices.

(*6*) *Tenderness and rigidity,* whether localized or generalized in the abdomen, indicates that a peritonitis is present. Associated with the tenderness and rigidity will be other signs of peritonitis, i.e., rebound tenderness, hyperaesthesia, fever and leucocytosis.

Special Examinations

(a) X-RAY. An X-ray taken with the patient erect may show fluid levels. There may be the pathognomonic "step-like" arrangement or, less frequently, a feathery herring-bone appearance. A plate taken with the patient in the supine position is very informative and often denotes the site of the obstruction. Barium enemas are given to detect large bowel obstructions. In paralytic ileus distention is seen throughout the abdomen. With mechanical obstructions, the distention involves only the portion above the site of the occlusion, even though there may be some gas seen in the colon beyond the obstruction.

(b) BLOOD. The blood picture, early in the obstruction, is normal or nearly so. Later definite changes in the blood are noticed. These include an increase in the haemoglobin percentage, white blood count, red blood count, CO_2 combining power, N.P.N. and blood urea. The blood chlorides are decreased. In large bowel obstructions a secondary anemia will be found.

(c) URINE. Urinalysis reveals a scanty and concentrated urine. Albumin, casts or indican may be present. Urinary chlorides are absent.

(d) FECES. Pus, mucus and blood are found in the feces in carcinoma. Blood alone is seen in cases of strangulation.

(e) VOMITUS. The vomitus varies depending upon the site of the obstruction. (See under Symptoms.)

(f) SIGMOIDOSCOPY. This is a useful procedure and confirms the diagnosis of carcinoma of the large bowel and impacted feces.

(g) TUNING FORK. When adadhesions are suspected between two organs (e.g. stomach and duodenum, gall bladder and colon) a tuning fork and stethoscope may be used to advantage. If the organs are adherent to each other, the vibrations of the fork over one organ will

be detected, by means of a stethoscope, in the other organ.

(h) PERITONEOSCOPY. This mode of investigation cannot be carried out in the presence of inflammation or adhesions. It is useful in detecting tumors, cysts, intra abdominal injuries, ectopic gestation, etc. This procedure is still in the experimental stage and is not practiced routinely.

Diagnosis

In acute intestinal obstruction the saving of life depends on prompt surgical intervention, therefore, early diagnosis is of the utmost importance. Unfortunately, diagnosis in the early stages is often difficult. First and foremost is the keeping in mind of the possibility of obstruction in every case of an acute abdominal upset. For diagnosis, it is essential that a careful history be taken, special attention being paid to the description of the pain and bowel habits. A detailed physical examination must be carried out. This must include (a) inspection for distention, peristalsis, post-operative scars, and the general condition of the patient, (b) palpation for an abdominal tumor, hernial orifices and rectal masses, (c) auscultation for heart disorders.

Strangulated hernia cases give a history of a long standing hernia. Abdominal tenderness, rapid pulse and shallow respirations occur early.

Volvulus has a sudden severe onset, usually during exertion. It rarely occurs before the age of forty. Extreme abdominal distention is seen early in this condition. A history of chronic constipation may be obtained. Volvulus is usually diagnosed at operation. The haemoglobin percentage may fall as much as 20 per cent after the first few hours of the onset of this condition.

Intussusception has a sudden onset, in a previously healthy infant, and occurs from the fourth to the tenth month in the child's life. Vomiting begins early, and usually after the passage of one normal stool the typical red currant jelly stool appears. A sausage shaped tumor may be palpated lying transversely across the upper part of the abdomen. Rectal examination will reveal the typical stool and if the condition has been present long enough the head of the intussusception may be felt. In the chronic form, which usually affects adults, the tumor is palpable and the patient emacited. A history of gradual onset with pain at intervals is given.

Paralytic ileus starts about two days post-operatively. There is a progressive distention of the small intestine which goes on to involve the stomach and later the colon. No pain, no tenderness or rigidity, and effortless vomiting usually designate this condition.

Fecal impaction may occur in the transverse colon, the sigmoid colon or the caecum. The tumor is usually palpable per rectum.

Adhesions are suggested when a history of salpingitis, appendicitis, cholecystitis or any abdominal inflammatory disease is obtained.

Carcinoma may cause irritation of the bowel giving rise to periodic attacks of constipation and diarrhea. Other manifestations of carcinoma may aid in the diagnosis of this condition, although these will be late.

Differential Diagnosis

Various diseases may stimulate acute or chronic intestinal obstruction, and very often mistakes in diagnosis are made. Some of the more common conditions to keep in mind when a suspected case of

intestinal obstruction presents itself are given below.

Peritonitis resulting from a ruptured appendix or peptic ulcer will be differentiated by a history and physical examination. The history of R.L.Q. pain which suddenly ceases, followed by a rapid pulse, diffuse abdominal tenderness, some rigidity and a small amount of vomiting, will aid in establishing a diagnosis of ruptured appendix. A history of an ulcer, followed by a sudden excruciating abdominal pain, and showing a typical subdiaphragmatic layer of air by means of the fluoroscope, will cinch the diagnosis of perforated ulcer.

Acute enteritis due to infection or other causes may give rise to severe crampy pains. It may be differentiated by the inevitable diarrhea as well as the history and nature of the constitutional symptoms.

Dietary indiscretions in the form of alcohol, spiced foods, or coarse foods, may be ascertained from the patient by interrogation. But, nevertheless, an attack of intestinal obstruction may coincide with or follow an improper diet. The presence or absence of diarrhea is an important factor in the differential diagnosis of this condition.

Lead colic will often simulate acute intestinal obstruction. But in this condition we are given an occupational history and a blue line is seen on the gums. An injection of 5 c.c. of calcium chloride intravenously will abolish this pain at once.

Acute haemorrhagic pancreatitis is most difficult to differentiate from intestinal obstruction. Diagnosis is suggested by rapid collapse, feeble pulse, distention high in the abdomen and a constipation which is not absolute.

Tabetic crises is distinguished by the presence of other signs of tabes, but one must remember that a luetic may get an acute obstruction as well as any other person.

Renal calculus is evidenced by a knife-like nauseating pain in the loin and back. In the majority of cases there s haematuria, costovertebral tenderness and no distention. But after all is said and done, the diagnosis will depend on radiography.

Regional ileitis is manifested by fever, diarrhea (always containing mucus and sometimes blood and pus also) and a mass in the R.L.Q. Some definite evidence of intestinal obstruction are associated with this condition.

Biliary calculus, strangulation of an ovarian cyst and torsion of a testis, may all simulate intestinal obstruction.

Prognosis

The high mortality in acute intestinal obstruction (40-60 per cent) is due to late diagnosis and improper treatment. The time element, in any of the acute intestinal obstructions, is most important. In cases of unrelieved high obstructions, death will occur sooner than in cases where the obstruction is lower down. If death occurs in the first twenty-four hours, it is due to shock, if it occurs later, it is due to intestinal toxemia or general peritonitis. The mortality in any major operative procedure in the bowel is high, and the extremely poor condition of the patient may be blamed for it in many instances.

Treatment

The treatment is intended to restore the continuity of the intestine as soon as it is feasible. Usually immediate operation is performed, but sometimes, there is an intentional delay of a few hours in order to restore the biochemical balance in the body. Any undue delay in the treatment of an acute obstruction may be disastrous. Early release of the constricting agent in the strangulated type of obstruction be-

fore gangrenous changes occur, is one of the most fundamental considerations in the treatment of all intestinal obstructions.

Purgatives must not be given in intestinal obstruction for they will play havoc with an intestine that already is improperly functioning. Morphia, which increases the movement of the intestines and also masks the true nature of the pain, must not be given until a diagnosis is established.

Generally speaking, most operations for intestinal obstruction are done to relieve the immediate obstruction—a follow-up operation being performed when a bowel resection is desirable.

A—Non-Operative Treatment

The restoration of fluid loss and gastro-intestinal decompression are the two chief prophylactic measures. This is accomplished by:

(1) rest in bed giving the patient nothing by mouth.
(2) venoclysis of 3000 c.c. of 5 per cent glucose in normal saline.
(3) a blood transfusion (whole blood or plasma) of 1000 c.c. or as much as is needed. It is stated that the blood loss in shock is probably in the neighborhood of 1000 c.c. in an average sized adult.
(4) Wangensteen's suction — syphonage apparatus. The latter has revolutionized the treatment of intestinal obstruction. Usually a Miller-Abbott tube (which has a balloon at the tip acting as a bolus enabling it to pass down the intestinal lumen) is used, as an ordinary catheter usually will not pass into the duodenum. The apparatus allows drainage of air and fluid from the upper bowel and thus relieves the distention.
(5) oxygen inhalation. This is used to combat manifestations of anoxia and "toxic" symptoms. Distention seems to decrease when oxygen is used.
(6) a rectal tube placed in the sigmoid to relieve the obstruction. A proctoscope is used as a guide for the tube. Small enemas are commonly used to relieve the obstruction from below.

B—Operative Treatment

Indications for immediate operation include the following manifestations: increased pain and local tenderness, increased pulse rate, appearance of fever or subnormal temperature, and increased white blood count. If decompression is not obtaining the desired results, and the patient's condition is becoming worse—operation is indicated.

Three surgical procedures are generally used, alone or in combination: (a) release of the obstruction, (b) enterostomy, (c) resection and anastomosis.

It is important to determine the viability of a strangulated loop of gut, at the time of operation. If the gut is not viable it should be resected either at the primary operation or at a later date, exteriorizing it pending the excision. Viability is considered to be present in the loop of gut if the normal lustre returns and mesenteric pulsations are palpable when the obstruction is freed.

Spinal anaesthesia is the anaesthetic of choice for most cases of intestinal obstruction.

(a) *Strangulated hernia* calls for immediate operation with no delay for conservative methods. Usually an attempt is made to reduce the strangulation before operation. If the strangulated loop is gangrenous it should be exteriorized (Mikulicz procedure) and a resection done at a later date. If the patient is not too ill, or the viability of the gut is doubtful, a resection may be done at the

primary operation. The hernia itself is to be dealt with by standard techniques.

(b) *Bands and adhesions* should be divided by operation. Many cases of obstruction due to adhesions will clear up with suction-syphonage alone. Enterostomy should be done in cases where the obstruction has been of long-standing. If a gangrenous area is present it should be inverted by means of the Summer's stitch.

(c) *Volvulus* demands immediate operation, with as little delay as possible. Simple untwisting of the strangulated segment is usually all that is necessary. Aspiration of the contents of the twisted loop may have to be done as a preliminary measure. Primary resection is the operation of choice in cases of volvulus where the bowel is found to be non-viable.

(d) *Intussusception* requires immediate operation also, although it is reported that some cases will undergo spontaneous reduction. The intussusception should be reduced, when the abdomen is opened, by gentle manipulation—not by direct traction. If this fails, the affected bowel should be resected and a lateral anastomosis carried out. Barium, under moderate pressure, may in some instances, reduce the invagination. In cases of chronic intussusception, the affected bowel should be excised.

(e) *Carcinoma* of large bowel that has caused obstruction usually necessitates an emergency caecostomy or colostomy in order to decompress the bowel. A colostomy is usually done if the carcinoma is located in the sigmoid or rectum. Bowel resection, if feasible, is carried out at a later date. If the hepatic flexure is involved, the decompression may be relieved by means of an appendicostomy. The surgical treatment of diverticulitis causing intestinal obstruction is the same as carcinoma of the same segment of colon.

(f) *Mesenteric thrombosis and embolism* calls for early operation and excision of the involved segment of intestine, followed by a lateral anastomosis. There appears to be a definite limit to the length of small intestine that can be removed from a human and still permit him to survive. A resection of more than 150 centimetres (complete length of small intestine averages 683 centimetres) carries a poor prognosis.

C—Post-Operative Treatment

The routine hospital post-operative care should be carried out. This will include, catheterizations, prevention of shock and pneumonia, fluids intravenously (3000-4000 c.c. of 5 per cent glucose in normal saline daily), nursing care, etc.

In addition to the above, continuous suction by means of the Wangensteen apparatus, should be carried out for a few days after the operation.

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BURNS

K. M. JOHNSTON, 4T4

Such a bewildering amount has been written about burns that it is difficult to know just which course one should follow in treating them. This paper is a review of the recent literature and some of the conclusions which at present are popular.

The American three degree classification is the one that is most widely accepted and is superseding Dupuytren's six group classification. This is based on first degree burns reaching no deeper than the basal layer of epithelium, from which regeneration is rapid and complete. The second degree reaches lower than this, but not deeper than the ends of the hair follicles and glands. From this, too, there may be complete epithelial regeneration. Third degree burns are any that are below this, and these heal by the formation of granulation tissue and leave a considerable amount of scarring. It is difficult to tell the depth of a burn in the early stages, but evidence of bleeding from the skin, or blanching on pressure, usually indicates that there is only partial skin loss.

Minor burns which do not cover much area and are not deep, will heal by themselves if left alone and not allowed to become infected. An ointment will help relieve pain, and almost any of the proprietary preparations such as Noxema, Butesin Picrate, etc., will be found soothing. Such simple remedies as holding the burnt area under cool water, or the application of a baking soda paste (not washing soda) will relieve pain. A sterile dressing, extending well beyond the burnt area, should then be applied. If there is evidence of blister formation in an early burn, a pressure bandage over the burn may allow revascularization of the top of the blister without having to drain or remove the top.

In the treatment of severe burns, and this is the subject of the vast majority of articles, any burn covering 10% or more of the body area demands immediate treatment. In an average adult, 10% of the body area would cover approximately the same area as the two open pages of this Journal.

The resuscitation and sedation of a severely burned patient is of paramount importance. Hyperactivity, when present, may be due to pain, fear and hysteria, or anoxia. In the treatment of pain, morphine should be given, but only on rare occasions will as much as half a grain be given. The best way to administer it is 1/6 grain intravenously, slowly, and at the same time another 1/6 grain subcutaneously by withdrawal of the needle. If the entire dose of, say ¼ grain, is given subcutaneously there is little effect seen at first because of the poor peripheral circulation. This might lead to another dose being given in a few minutes. Now, if by this time the peripheral circulation has been partly restored by shock therapy, the entire dose of ½ grain will begin to show its effects of oversedation and respiratory depression. Should this occur, a tourniquet applied above the level at which the sedative was given will slow down the absorption of the drug. Fear and hysteria are best treated by the intravenous injection of a barbiturate such as sodium nembutal in grain-and-a-half doses. If there is pulmonary damage, no more than two such doses should be given.

Anoxia due to edema of the airways does not usually come on for three or four hours after the fire. It is treated by

intratracheal intubation or tracheotomy. Bronchospasm is initiated primarily by heat or by irritating gases, such as nitrous fumes. Treatment of this with adrenaline or ephedrine is not of much value. Aminophylline, 7½ grains given intravenously, has a beneficial effect which is, however, of only twenty to thirty minutes duration. In all cases of injury to the airways it is important to humidify the air that is to be breathed.

Therapy for severe lung complications is difficult but must be carried out vigorously. Early problems are those of getting enough oxygen, reducing edema of the mucous membranes, and avoiding pulmonary infections. Oxygen in high concentrations is obviously needed. Saline or glucose intravenously is contraindicated since it adds to the pulmonary edema, but plasma does not have this harmful effect. In the later subacute stage, the main problem is to lessen the viscosity of the mucus and sputum. Moist atmosphere (steam) helps, as does aminophylline or ammonium carbonate. Gravity drainage through posture, when this is practicable, is also of value. The amount of burn inside the airways is not ascertainable soon, and one cannot predict the outcome where there has been the possibility of such a burn. Even minimal surface burns may serve as a mask behind which acute, and even fatal, pulmonary edema may lurk. It has been found that covering the mouth and nose with a wet cloth may prevent entirely respiratory burns.

A method of anaesthesia for burns has been described which takes advantage of the increased diffusion of fluids at the site of the burn. One gram of procaine (novacaine) is dissolved in 500 cc. of 5% glucose in saline and this is given intravenously. The fluid diffuses out to the tissues at the burnt area, but does not leave the vessels in the rest of the body. It is not necessary to give the entire gram of anaesthetic once anaesthesia sufficient to allow dressing has been obtained at the burn. In the ten cases described there were no toxic reactions from the drug.

In the treatment of the actual burnt surface the popularity of the tannic acid method is definitely on a down grade. The cleaning and debridement necessary, lead to much shock if attempted without anaesthetic, and if an anaesthetic be given, there is shock resulting from it. However, delay in the care of the wound will lead to bacterial contamination which will give an infection leading to more shock. It is obvious, then, that whatever is done should be preceded by treatment of the shock present or impending. To this effect, the blood picture should be followed. A rise of 10% or more in either haematocrit or haemoglobin estimation demands treatment in the form of fluids. This haemoconcentration occurs chiefly in the first 24 hours, and is combatted by the use of plasma, serum, or a suitable substitute such as isinglass. The amount to be given is measured roughly at 1,000 cc. in 24 hours for each 10% rise in a 160 lb. man. In children, this may also be calculated at about 3 cc. per 10 lbs. of body weight for each 1% rise in haematocrit or haemoglobin reading. The urinary output should be measured and enough fluids given to maintain the output at around 1,000 cc. per day.

In the Massachusetts General Hospital, where many of those injured in the Cocoanut Grove conflagration were treated, there was no debridement or tanning carried out. Gross dirt was sluiced off with saline, but this was the only cleansing which the patients suffered. A bland ointment of 10% boric acid in petrolatum was applied on strips of fine mesh gauze. These were covered with sterile gauze and bandaged under pressure of roller elastic

bandages on top of ordinary gauze. On the trunk, stockinet rolls were applied. For the eyes, 5% sulfathiazole ointment was applied, the eyes closed and incorporated in the head bandage. Two grams of sulfadiazine were injected intravenously soon after admission, then four grams a day was given by mouth. These dressings were not changed until at least the fifth day, and in many cases not until the tenth. Wet dressings were found more comfortable than the boric ointment, after the first dressings were removed.

The rationale of this treatment was described in the following manner. Of the various treatments which would give approximately the same results the simplest was chosen. While debridement is necessary for good tanning it is time-consuming, painful, and not necessarily indicated in other treatments. Cleansing without scrubbing does not reduce the significant number of contaminating organisms, and the scrubbing may destroy viable epithelium. When non-debridement was suggested after Pearl Harbour, there was raised the objection that the blister fluid was a culture medium for anaerobic bacteria. This has been investigated and it has been found that the broken blisters will usually curl up in a corner and be no better culture medium than the coating of fibrin which forms between cells and dressings. The chief disadvantages of non-debridement, then, seems to be that it looks messy.

Local sulfonamides were not applied because it had been found that absorption from local application to a debrided surface of a burn was rapid but irregular. (It has not been measured from a non-debrided surface.) II was decided that internal administration gave more easily controllable levels, and it was hoped that a good local level could be obtained since there is an increase in the permeability of capillaries at the burn site, and delayed clotting time of edema and bleb fluid. This was borne out when the measurement of sulfonamide level in the blister fluid twelve hours after the administration of 2 grams of sulfadiazine was found to be the same as the blood level. It was noted, however, that after the fibrin begins to form in the bleb, the drug does not readily permeate through. This was shown when sulfadiazine was given 60 hours after a burn and in twelve hours the blood level was 8 mg.%, while the bleb fluid was only 3 mg.%.

Pressure bandages do reduce the amount of fluid and plasma loss, but do not prevent the occurrence of edema. Where there would have been fluid loss from the burnt area, the fluid was expressed into the tissues beyond the pressure bandage. There was no evidence to show that healing was expedited by the use of pressure. The average time for slough to separate from the rest of the tissues is about 25 days when treated in this manner, and does not seem to be influenced by the patient's general condition, duration of chemotherapy, or the extent of the burn. Splinting of the limbs, by incorporating newspapers in the outer dressings, produced lymph stasis, which, along with the sulfonamide, confined the bacterial infection to the devitalized tissues. By the tenth to twelfth days the destroyed skin had begun to separate and there was suppuration about the margins, with pus escaping through openings in the slough. However, no cellulitis or lymphangitis indicative of invasive infection was apparent.

The Bunyan envelope was found to be uncomfortable in those cases in which it was used. There was burning pain when the bag was filled with saline, and it was equally uncomfortable when filled with oxygen. The lack of support for

the limb, and the discomfort on contact with the wall of the bag were also commented upon. Strands of slough and exudate were suspended in the fluid, but did not separate well.

Grafting of the burnt areas should be done early and not left for weeks. This is especially true for the hands and face, where contractures mean much disability. Three weeks is considered the optimum time to start grafting.

The consideration of the more special burns includes electrical and chemical burns. Chemical burns should be washed off with a lot of water and one should never try to neutralize an acid burn with dilute alkali or vice versa. The water will dilute the harmful agent rapidly and will neutralize sufficiently if enough water is used. This is especially to be noted in the eyes where a lot of water is the safest procedure. Where there are particles of lime embedded, they should be picked out immediately and a douche of 3% soda bicarbonate or boric acid used. However, where there are particles of phosphorus from an explosive flash, they should not be washed off with water, but kept dry and then painted with a 1% solution of copper sulphate, followed by lavage with normal saline. Burns from the phenol-containing compounds such as lysol or solyol are best treated with alcohol. In the uncomfortable but not particularly dangerous type of burn suffered from red peppers or onions at the pickle-making time of year, the skin should be well washed and scrubbed with a brush. If this is not sufficient, an ointment containing a local anaesthetic such as nupercaine should be applied.

Electrical burns penetrate much more deeply than do thermal burns. If left alone and infection prevented, there will be separation of the burnt area by an aseptic necrosis, leaving a bright pink scar. This takes several weeks and may often involve the tendons in a solid block of scar tissue. The resultant slough is often two or three times the extent of the original lesion, probably from the disintegration of the media of arteries often far distant from the original lesion. Grafting will often be necessary in this type of burn.

In conclusion, a few remarks about the closed plaster treatment of burns should be made. This was being used in Germany in 1939 and in England a short time later, but has only recently been tried in this country and there is as yet not much data on its success. The plaster is applied over two thickness of gauze impregnated with vaseline. Not only the joint above and below the burn should be immobilized, but also the segment of skin above the proximal joint. This is to prevent the skin from pulling on the burn site and causing destruction of new epithelium by friction against the plaster. Trueta changes the plaster at ten day intervals. Roulston claims for the plaster treatment the following virtues, almost immediate freedom from pain, rapid improvement in the patient's general condition (as judged by fall in pulse rate and temperature, and ease of nursing, which is important in the armed forces), prevention and correction of contractures. He also suggests that there is more rapid epithelization, but this has been questioned.

For a discussion of the classification and clinical course of burns, the reader is referred to the booklet "Treatment of Thermal Burns" put out by the National Research Council of Canada.

Abstracts

K. F. CLUTE, Editor

Contributors

R. M. Bremner
Miss E. V. Duggan
J. B. Firstbrook
H. Kalant
R. K. MacDonald
Miss I. D. Moon

MEDICINE I

A Clinical Evaluation of Sulphamerazine

Anderson, Oliver and Keefer
New England Journal of Medicine,
March 30, 1944

Experimentally, the advantages of sulphamerazine (sulphamethyldiazine) are greater solubility than sulphadiazine, more rapid and more complete absorption from the gastro-intestinal tract and slower excretion by the kidneys. Using equal doses of sulphamerazine and sulphadiazine, it is possible to obtain and maintain blood levels of sulphamerazine that are on the average more than double the values obtained with sulphadiazine. This suggests the probability of achieving and maintaining blood levels of sulphamerazine comparable to those with sulphadiazine by a reduced total dosage and a longer time interval between doses. When similar blood concentrations are maintained, the toxic effects of sulphamerazine are no different and no greater than those which follow the administration of sulphadiazine.

The authors report the results of the treatment of 278 patients with sulphamerazine in various infections—lobar and broncho-pneumonia, meningitis, facial erysipelas, subacute bacterial endocarditis, acute otitis media and urinary infections. Generally the adult dosage was 2 Gm. stat., followed by 1 Gm. q. 8 h., continued until 48 to 96 hours after disappearance of fever and apparent clinical recovery. In most cases, equal quantities of sodium bicarbonate were not given with each dose of the sulphonamide.

Sulphamerazine is most satisfactorily evaluated by comparison with sulphadiazine. Sulphamerazine exhibited a therapeutic efficiency similar to that of sulphadiazine in the treatment of pneumococcal pneumonia, meningococcal meningitis and erysipelas. The results obtained in the treatment of staphylococcal infections were not encouraging. Sulphamerazine was clinically effective in total doses that were on the average ½ to 1/3 less than the amounts of sulphadiazine usually administered for similar conditions.

Toxic reactions to sulphamerazine were in general of the same character and occurred with about the same frequency as those caused by sulphadiazine. A greater tendency for sulphamerazine to produce leucopenia and to cause drug rashes and drug fevers constitutes a possible exception to this statement. Although sulphamerazine is significantly more soluble than sulphadiazine, its solubility is still sufficiently poor so that complications involving the urinary tract are to be looked for.

R.M.B.

MEDICINE II

Acute Pericarditis Simulating Myocardial Infarction

Louis Wolff, M.D.

New England Journal of Medicine,
April 6, 1944

The occurrence of pericarditis in association with rheumatic fever, tuberculosis, septicaemia, pneumonia, and myocardial infarction is usually readily recognized. However, acute pericarditis unassociated with these diseases had recently been observed. The clinical picture strikingly simulated that of acute cardiac infarction, which was at first diagnosed in 80 per cent of cases. The location, distribution, character and duration of pain, together with dyspnoea, circulatory collapse, fever, leucocytosis, elevated sedimentation rate, pericardial friction rub, dilatation of the heart and electrocardiographic abnormalities constitute a clinical picture almost indistinguishable from myocardial infarction. The author suggests several useful points in the differential diagnosis.

Manifestations of Infection, such as chills, a "grippy" feeling, and actual respiratory infection are more frequent in pericarditis than with infarction.

Pain. The distinguishing feature is aggravation of the pain on exertion, by bodily movements (such as turning over in bed, coughing, and inspiration), not by the effort involved. This is evident from the very outset.

Pericardial Friction Rub is usually never heard in cases of myocardial infarction, but in acute pericarditis a loud rub is characteristically heard within a few hours after the onset of pain and is constantly present for days.

Fever and *Leucocytosis,* when they occur in acute pericarditis, usually reach a higher level and last longer than in cases of infarction.

Electrocardiograms. Certain similarities are observed in acute pericarditis and acute myocardial infarction, but the patterns are readily differentiated by distinctive characteristics.

It is important to make the correct diagnosis, since in pericarditis prolonged and careful treatment is unnecessary and the prognosis is excellent, in contrast with the seriousness of myocardial infarction.

R.M.B.

MEDICINE III

Migraine Headaches Relieved By Hypoglycaemic Reaction; Report of Two Cases

Sidney J. Tillim, M.D.

Annals of Internal Medicine,
Vol. 20, No. 4, April, 1944

In this article are reported two cases of migraine, which were relieved by the administration of insulin. Each of these patients had suffered so severely that previously only morphine had been of any avail in relieving their pain; and both had become addicted to this drug.

The dose of insulin was gauged by the patient's reaction. An adequate amount was given to cause diaphoresis, thirst, somnolence, hunger, constriction of the pupils, and a reduction in cardiac rate. It was unnecessary, however, to produce coma or loss of consciousness.

The response to intravenous administration was twice as rapid as when the drug was given intramuscularly. In the cases described, relief was obtained in from twenty to thirty minutes.

Insulin first causes an adrenosympathetic response. This usually is of very brief duration and is succeeded by para-

sympathetic activity. This latter, the author believes, is responsible for the relief of the headache, since vascular spasm is combated.

K.F.C.

SURGERY I

Acute Perforation in Gastroduodenal Ulceration; with Special Reference to End-Results

W. L. Estes, M.D., and
B. A. Bennett, M.D.

Annals of Surgery
Vol. 119, March, 1944

In this paper the authors present a statistical analysis of 80 consecutive cases of acute perforated gastroduodenal ulceration.

The great majority of patients were males (78 out of 80) and the peaks of age incidence were in the 3rd decade for duodenal perforations, and in the 5th for gastric perforations. There was apparently uniform year-round distribution.

No clear aetiology could be determined, and although there seemed to be some relationship to food intake in 27 cases out of 80, there was a wide range of factors mentioned—excitement, physical exertion, and extrinsic trauma, among others.

Of the 80 cases, there were 63 duodenal, 16 gastric, and 1 jejunal. Only 8 out of 25 cultures of the peritoneal fluid, taken at operation, were positive, and in these there was no characteristic organism.

The clinical picture was characteristic, with sudden, agonizing, unrelenting epigastric pain, and marked prostration. In all those cases in which the perforation was not plugged by omentum, exudate, or adhesions, there was a picture of scaphoid abdomen, extreme rigidity and spasm, and extreme tenderness. Shock was *not* a feature, only six cases having a systolic pressure between 80 and 100 mm. on admission. The pulse is characteristically full and unaccelerated. It is possible that a slight degree of transitory shock occurs, disappearing before the patient reaches hospital. All but two patients gave histories of preceding ulcer symptoms, ranging from 2 weeks to 40 years, but averaging 4.8 years, while some 27 per cent reported preperforation bleeding. The average W.B.C. on admission was 15,800, only nine being under 10,000. In addition to the above picture, further diagnostic evidence is provided by X-ray demonstration of pneumoperitoneum, which was obtained in 72 per cent of the cases in this series.

Operative treatment, it is felt, should be confined to treatment of the emergency, and not of the ulcer. Therefore simple closure of the perforation is the treatment of choice. Under spinal anaesthesia, the perforation is closed by a purse-string suture, and invaginated into the lumen by two rows of inversion sutures. Drainage is used only in late cases, or in those where satisfactory infolding has not been obtained and further leakage is possible.

The incidence of postoperative mortality varies directly with the delay in operation, there being no deaths in 38 cases treated within 6 hours, while there were 5 deaths in 15 cases treated after 18 hours. Spinal anaesthesia and appropriate intravenous therapy appear to be helpful in reducing the mortality and complications as do postoperative gastric suction and sulphonamide therapy where indicated.

A detailed discussion of end results is given in those 53 cases out of 80 which could be followed. Of these, 5.6 per cent were completely cured, 71.7 per cent had continued or recurrent ulcer symptoms, controlled by medical treatment, and 22.8 per cent required further surgery or hos-

pitalization for relief. The detailed criteria for classification of their cases, with respect to end results, are given. Recurrent ulceration appeared to be independent of the type of operative measure used to close the perforation. Additional surgery (gastroenterostomy or resection) was required in 4 out of the 50 cases of simple closure.

Reperforation occurred in eight cases, three in the original site and five in new sites. The time of recurrence of symptoms of ulceration seemed to be unrelated to the time at which reperforation followed the original perforation. The aetiological factors in these cases seemed to be (1) dietary indiscretions, (2) overindulgence in alcohol and tobacco, (3) marked gastric hyperacidity, (4) possibly heavy work. Therefore, to prevent recurrent ulceration and possibly reperforation, the authors suggest that partial gastrectomy be performed in all cases which show persistent gastric hyperacidity following treatment of perforation.

H.K.

SURGERY II

Lateral Rupture of the Cervical Intervertebral Discs

R. G. Spurlin, Lieut.-Col., M.C., A.U.S., and Wm. B. Scoville, Capt., A.U.S.

Surgery, Gynecology and Obstetrics
Vol. 78, No. 4, April, 1944

Pain in the arm and shoulder is a very common complaint, too often diagnosed as "neuritis," just as most low back pain was, until recently. It seems likely that ruptured cervical intervertebral discs are at fault in many cases.

The cervical roots lie immediately over the intervertebral discs, and consequently may be compressed by a relatively small lateral protrusion of the discs, which leave the spinal cord unaffected. Greatest strain on the cervical spine comes at the 5th and 6th interspaces, which are frequently seen radiologically to have narrowed discs with accompanying evidence of arthritic bony spurs.

Trauma, either severe or minor, plays a role in the causation of some cases, but degenerative changes are likely more important. The quantity of nucleus pulposus in a cervical disc is relatively small, and even in acute cases the size of the herniated mass is often surprisingly small. Often, however, it is covered by osteophytic growth, which further compresses the roots affected.

Pain and stiffness of the neck are usually the earliest symptoms. The pain, of an "electric shock" type, radiates into the shoulder, arm, and hand, in the dermatomes corresponding to the affected root. The pain is worse on coughing, straining, sneezing, prolonged maintenance of a single position in bed, and *application of pressure to the top of the head with the head and neck tilted to the affected side.* Numbness and "pins and needles" paraesthesias are common and in some cases there may be circulatory impairment in the limb, with a cold blue hand; this, however, is due to an associated scalenus anterior syndrome and not to the disc lesion. Sensory deficit in the affected dermatome is late, as is muscular weakness, although both are extremely valuable localizing evidence. In such cases, muscular weakness, and even atrophy and fibrillation may be quite severe. The biceps tendon reflex is weakened or lost with a C5 lesion, the triceps jerk with a C6 lesion. The lesion may be readily demonstrated by roentgenography, with subarachnoid injection of pantopaque, appearing as a defect in the vertebral canal, if large, or more often as obliteration of the men-

ingeal sleeve surrounding the affected root in its intervertebral foramen.

The main condition to be differentiated from this is a scalenus anterior syndrome, but this may be easily told apart by the predominance of vascular changes and the involvement of C8 and Th1, which are never affected by disc lesions.

For mild cases, bed rest with 5 to 10 pounds of continuous halter traction may be sufficient. If no relief is obtained after 3 or 4 days, surgical removal should be undertaken in the manner which the authors describe, and which they feel to be simple and sage, and extremely effective. The operation may be performed under procaine nerve block, or intratracheal ether anaesthesia, and consists of unilateral partial laminectomy above and below the lesion, and removal of the offending mass, with decompression of the nerve root. The recumbent position is maintained postoperatively until there is no residual pain in the shoulder or arm, which varies in length from 1 to 12 days. All the cases reported by the authors are completely cured.

H.K.

SURGERY III

Rapid Identification of the Clostridium Welchii in Accidental Wounds

W. A. Altemeier, M.D., F.A.C.S.,
Cincinnati, Ohio

Surgery, Gynaecology and Obstetrics
Vol. 78, No. 4, April, 1944

Treatment of gas gangrene must be instituted early, if it is to be effective. Many of the cases in which this condition develops are wounds which require heavy dressings and casts. Direct observation of the wound is rendered difficult or impossible, and valuable time is lost before the presence of the gas gangrene is recognized.

Clostridium Welchii is the most important organism in this condition, as it was found to be present in from 72 to 80 per cent of cases studied during the last war. The test by which this organism can be identified with the greatest certainty is the stormy fermentation of milk; but, whereas this requires from 18 to 48 hours as it is usually carried out, the author describes a method by which the presence of the organism is demonstrated in from 5 to 10 hours. The essential points in speeding up the fermentation are as follows:

(1) A milk of high grade is used as less of its lactose has previously been fermented by other organisms.

(2) The milk is sterilized in the oven on three successive days instead of in the autoclave, as in this way caramelization of the lactose is avoided.

(3) Removal of the cream accelerates the reaction.

(4) No indicator, such as litmus, is employed, as this retards the fermentation.

Experiments are described, in which known numbers of Clostridia Welchii were placed in wounds of guinea-pigs under aseptic conditions and the infected muscle tissue removed and cultured after periods of from 1 to 5 hours. When even as few as three of the organisms were placed in the wound, stormy fermentation of the milk was found to occur in less than ten hours.

When the infecting organism is Clostridium Welchii, the clot formed during the fermentation floats on top of the whey and the latter has an offensive odour. The fermentation reaction is similar for Clostridium Butyricum and for Clostridium Multifermentans; but they are motile, while Clostridium Welchii is not. Clostridium Welchii is distinguished from Bacillus Coli and Aerobacter aerogenes

by the facts that the latter two ferment milk more slowly, that the clot sinks instead of floating, and that the whey has no offensive odour.

K.F.C.

OBSTETRICS and GYNAECOLOGY

The Effect of the Interval between Births on the Maternal and Foetal Outlooks

N. J. Castman, M.D.
American Journal of Obstetrics and Gynecology
April, 1944

This article was written to refute statements made by Woodbury in 1925. He stated that the infant mortality was much higher in infants born in the first year following delivery than those born four years after, i.e., at a time which he considered to be optimum. His conclusions were widely used as indications for contraception and "child spacing."

Dr. Castman has studied this problem by two methods, direct and indirect.

(1) *Direct Method.* Here the effect of known intervals on over five thousand accurately recorded cases was studied. Multiparae were divided into the following groups:

(a) Very brief interval, less than 12 months.

(b) Brief interval, 12-24 months.

(c) Moderate interval, 25-48 months.

(d) Long interval, more than 48 months.

It was found that there were relatively few "very brief" cases, but that the infant mortality in this group was very high. However, Castman stresses that for full-term pregnancy to occur in this group conception must occur in the second or third month post-partum, which is unlikely to happen. Therefore he concludes that such cases as do fall into this group will of necessity be mostly those of abortion and premature labour. Hence the high infant mortality. Actually there was a higher incidence of abortion and premature labour. The infant mortality rises slightly in the long-interval group.

As for maternal mortality, it rises somewhat in the long-interval group since these patients are older and more susceptible to toxaemia.

There is no increased incidence of premature labour, anaemia, postpartum haemorrhage or puerperal infection in the "brief"-interval group as compared with longer-interval groups.

(2) *Indirect Method.* Parity was correlated with age. It was found that in women aged 20-24 years the foetal mortality was no higher in para iv women (i.e., shorter intervals between births) than in those who were para ii at this age. The maternal mortality was similarly unaffected.

Dr. Castman believes that since birth is uncommon in the first year postpartum and since older patients are more susceptible to toxaemia "child-spacing," especially at the recommended four year interval, is contraindicated.

I.D.M.

PAEDIATRICS

Mental Development of Congenitally Hypothyroid Children

Hilde Bruck, Donovan J. McClure, New York

American Journ. Diseases of Children
March, 1944

The purpose of this paper is to follow the mental development of congenitally hypothyroid children and to assess its relationship to physical development and

to adequacy of treatment. Twenty-three cases are studied over periods up to 10 years. Adequacy of treatment is determined quantitatively by measurement of blood cholesterol level. Physical response is measured by change in facies, height quotient, and skeletal age. Mental development is shown by the Stanford-Binet test as well as by other performance and drawing scales.

Throughout the group there is found a low correlation between the figures for somatic and mental development. The mean height quotient is 92.4 (slightly below normal) whereas the mean intelligence quotient is 62.2. The mean I.Q. of children treated after 3 years is 60. There is a slightly greater difference between the regularly treated and irregularly treated groups—the mean I.Q. of the former being 68.4, that of the latter 61.0. There is no relation between duration of treatment and mental development.

Certain observations are made on individual cases. In one case treatment was begun at 5 months, and continued adequately and regularly. The final intelligence quotient was 112. It was observed, however, that there were signs of adequate motor development (holding up the head at 4 months) and adaptive behaviour before treatment was begun. Other cases showed no increase in intelligence quotient in spite of dramatic physical response to treatment. These children, however, became happier in disposition, less apathetic, having better understanding of their environment, and improved toilet habits. In another group of children it was noticed that increase in the dose of thyroid extract gave rise to emotional disturbances and restlessness. Performance of tests in these cases was much better after a short period of deprivation of thyroid. The case of a girl treated first at 9 months must be mentioned. Adequate, regular treatment up to the age of 6 years resulted in physical development that was better than average. Mentally, however, no improvement was noted, the I.Q. remaining at 21.

Conclusions

The prognosis with thyroid treatment is uncertain. Physical improvement is to be expected, but little change may occur in I.Q.

With treatment, however, the child may be more alert and better able to use such endowment as he has. Too vigorous therapy may cause emotional disturbance.

E.V.D.

HYGIENE AND PREVENTIVE MEDICINE

Preparedness for Defence Against Influenza

Ward J. MacNeal and
Ernestine R. Parker
Dept. of Bacteriology, New York Postgraduate Medical School and Hospital, Columbia University

American Journal of Clinical Pathology
Vol. 14, No. 2

With global conditions today approximating those of 1918, there is growing apprehension concerning a recurrence of the 1918-19 pandemic influenza.

Experimenting with animals, using infected nasal mucous instillation as a method of transferring the disease, has shown that there are two aetiological agents to be considered. A filterable virus produces a highly contagious "filtrate disease," in which there is superficial mucosal damage of the respiratory passages. A small gram-negative bacillus causes widespread lung damage, in the presence of the virus infection, but it is incapable of producing disease when alone.

The bacillus is Pfeiffer's bacillus (Hae-

mophilus influenzae). The author contends that failure to find it in the lesion should be scrutinized with special attention to the efficiency of the procedure employed. Pneumococcus, streptococcus, staphylococcus, and Friedlander's bacillus may also be present.

Exposure of a human to massive quantities of virus-infected material usually produces infection. The number and virulence of the virus is the greatest factor concerning susceptibility.

The virus is transferred by droplet infection, dry droplet nuclei, and by dust in air currents. Outside the body, the virus is known to be potent for many days.

World War I experience has shown that heavy duty men have the highest morbidity and mortality rates. Predisposing factors are the presence of local irritants, as ether anaesthetics, irritating dusts, fatigue and alcohol.

In studying prophylaxis, it has been found that vaccine is yet of no value. Gauze masks worn in hospitals may be effective in retarding spread of the infection. Throat gargles, mouth washes, and nose sprays have been proven to reduce the chance of upper respiratory infection, and lessen the number of bacteria in the throat. Mild germicidal agents are known to be effective in combatting the virus.

In crowded areas, air-conditioning naturally lessens the chance of infection. The latter is most effective when all the bacteria are destroyed at the air inlets.

R.K.M.

PHYSIOLOGY

Pathogenesis of Diabetes Mellitus

F. D. W. Lukens

Yale Journ. Biol. Med.

March, 1944

Most authorities accept an inborn inadequate insular reserve as the primary cause of diabetes mellitus. Precipitating factors are assumed to operate.

A.—*Inheritance.*

1.—Direct Evidence in Man.

Many observers have noted a familial tendency. White finds that her data accord with the hypothesis that the diabetic tendency is inherited as a Mendelian recessive. Woodyat and Spetz have noted the phenomenon of "anticipation." Diabetes tends to occur earlier in succeeding generations.

2.—Heredity and the Pancreas.

Attempts to correlate the size and mass of the pancreas at autopsy with clinical diabetes have not yielded satisfactory evidence of hereditary pancreatic abnormality.

Insular reserve against the action of anterior pituitary extract (A.P.E.) varies in individual dogs and widely with species. This reserve is not related to body weight nor to gross pancreatic weight.

3.—Inheritance of Pituitary Dysfunction.

There is a tendency for patients at the onset of diabetes to be above the average height for their age. Rats with hereditary low glucose tolerance show an increased rate of growth, are heavier than average, and show a fasting blood sugar slightly higher than normal. These facts suggest that A.P.E., which contains a growth principle, when in excess, predisposes to diabetes and this excess A.P.E. production may be inherited.

B.—*Factors Taxing Insular Capacity, and Damaging Island Tissue.*

1.—Hyperglycaemia.

Allen, in 1922, showed that partial pancreatectomy led to hydropic degeneration of the islets in dogs. This went on to atrophy but not fibrosis. Injected insulin

leads to morphological recovery of the islets but must be continued because the remaining pancreas is too small to support the bodily needs.

The studies of Haist, Campbell and Best, of Houssay *et al.*, and of Young show that islet damage is associated with hyperglycaemia. Partial pancreatectomy and A.P.E. only produce islet damage if hyperglycaemia occurs; but there is evidence that some unknown factors besides hyperglycaemia are at work.

Lukens and Dohan have studied pituitary diabetes in cats. If treated within the first three months of glycosuria with insulin, low diet, adrenalectomy, or phlorhizin (all of which lower blood sugar) hydropic islet degeneration may be reversed. Atrophy is irreversible. The duration of the diabetes, rather than its severity, is the factor limiting recovery. Lukens believes that the lowering of blood sugar is the important factor in islet recovery. He points out that insulin and phlorhizin both lower blood sugar (the latter by impairing tubular reabsorption of glucose in the kidney) but have contrasting effects on protein catabolism, ketogenesis, and liver and muscle glycogenesis.

2.—Experimental Alloxan Diabetes.

Injection of alloxan leads to islet necrosis and diabetes in rabbits and rats. This experimental toxic diabetes may have analogy in some cases of human diabetes.

The author summarized his review with a table and he points out that the picture is not complete. The role of obesity and the direct demonstration of causes in humans remain a challenge.

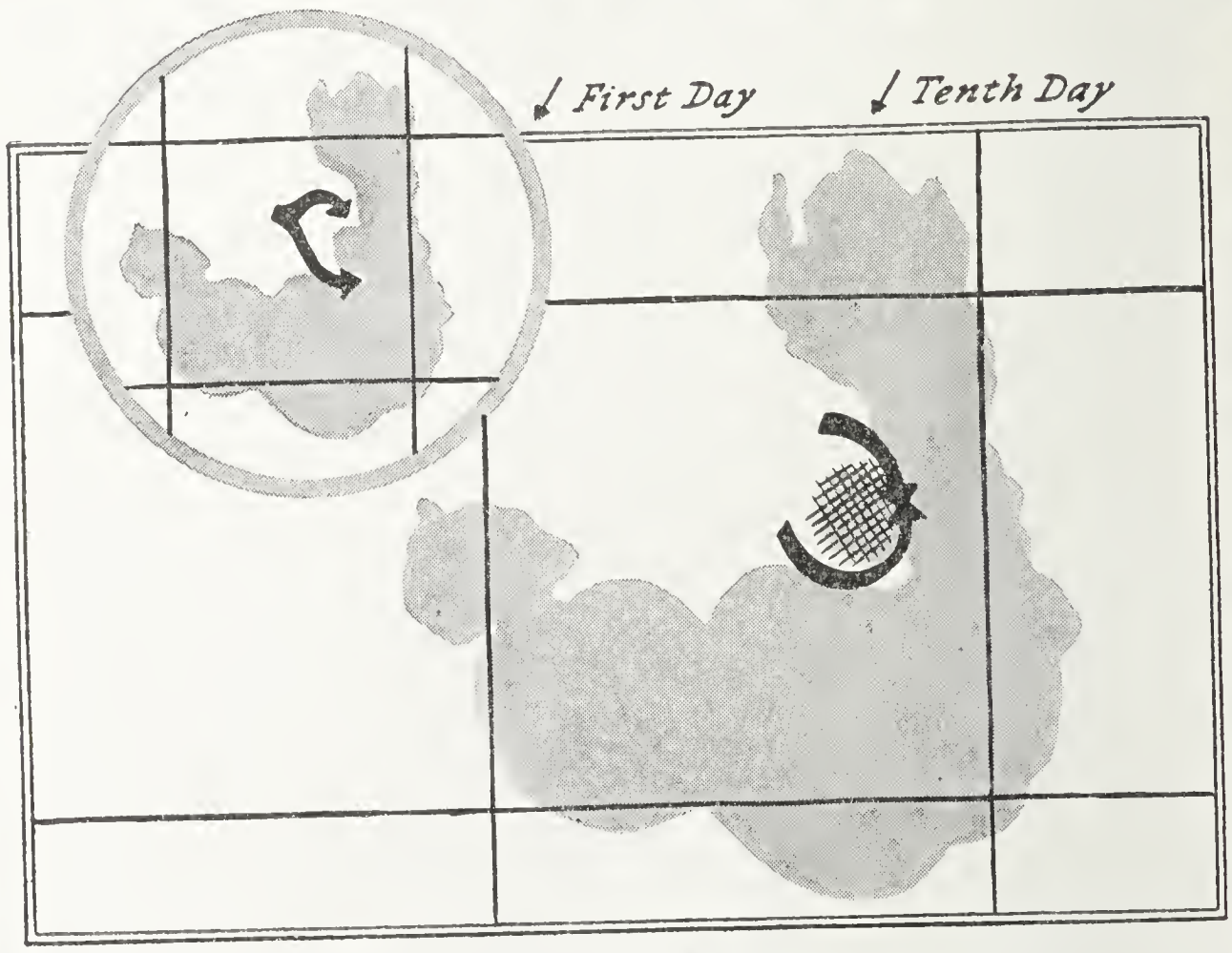
J.B.F.

ASHLEY & CRIPPEN

PHOTOGRAPHS

196 BLOOR STREET WEST

AN IMPRESSIVE PERFORMANCE



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*WOLDMAN, E. E. and POLAN, C. G.; The Value of Colloidal Aluminum Hydroxide in the Treatment of Peptic Ulcer; A review of 407 Consecutive Cases, Am. J. M. Sc. *198:* 155-164 (Aug.) 1939.

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STANDARDS OF QUALIFICATION

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In their answers, written or oral, candidates in the Final Examination must show evidence of critical judgment.

PLACES AND DATES OF EXAMINATIONS—1944

The Centres selected for the Written Examinations are Vancouver, Edmonton, Saskatoon, Winnipeg, London, Toronto, Kingston, Montreal, Quebec, and Halifax—October 2nd, 3rd and 4th.

Oral Examinations in the Primary subjects and Oral and Clinical Examinations in the Final subjects will be held as follows:

—at Montreal—October 23rd and 24th.

THE FELLOWSHIP FEE

Candidates taking the Final Examinations will please note that the Fellowship Fee ($150.00) must be paid in advance, this will be returned if the candidate is unsuccessful in passing the examination.

Candidates who are graduates of 1930 or prior thereto of a Medical School or University approved by Council shall not be required to take the Primary Examination, but shall in the Final Examination demonstrate a general and practical knowledge of the clinical application of Anatomy and Physiology.

This special examination shall be conducted by Clinicians.

Address all communications to—

Warren S. Lyman, M.D., F.R.C.P.(C.),
Honorary Secretary,
Room 3018, National Research Laboratories,
Sussex Street, Ottawa, Ontario.

Observations on the Metabolism of an Infant

By FREDERICK A. J. ZEIDLER, Ph.D., F.C.I.C.

A HIGHLY nourishing and concentrated food is imperative for the growing infant and young child. The energy output of the individual, under standardized conditions, or, the *basal metabolism*, may be taken as an indication of certain needs of the organism. An internationally known authority, Mary Swartz Rose,* states:

> *"By the end of the first two weeks, the sleeping metabolism of the baby will have risen to approximately adult level, but it does not stop there; instead it keeps on rising rapidly until the end of the first year or early part of the second, when it reaches the highest point in the normal life of the individual. Thereafter, it declines, the rate varying with age until the adult level is reached."*

This difference between child and adult indicates that proportionately larger amounts of fuel must be provided. Nor is this the only indication. The average baby may raise his basal metabolism (which is already proportionately higher than the adult's), by 65%, merely by crying. By vigorous crying the basal metabolism may be raised by 200% in some instances.

The first year of a baby's life is one of the periods of greatest storage in growth, and this storage is only possible when the *basal energy requirements* and the *calories needed for activity* have been supplied. It has also been found that on the basis of body weight the child's *basal metabolic rate* is more than twice as great as the adult's. These facts coupled with the anatomy and physiology of the infant's digestive tract and its inability to handle bulky or coarse foods bring us to an important consideration, that is, the *best blending of the various food elements* to supply these energy requirements and to take care of the specific dynamic action of the food itself.

The ingestion of *protein*, which is so necessary for the growth of the body, greatly stimulates the metabolism for several hours. Carbohydrates and fats have a much slighter stimulant action. In NUTRIM *"complete" proteins*—from animal and from vegetable sources—are combined with fat and carbohydrates in such proportions that the needs of the growing individual are met in each and every respect.

The *Thiamin* and the *Niacin*—two vitamins of the B-Complex contained in NUTRIM—assist in the breakdown of the carbohydrates, which in turn aid in carrying to completion the combustion of the fats. The *Thiamin* also stimulates appetite, promotes growth, and aids in the digestion and utilization of food. Another vitamin of the B-Complex contained in NUTRIM is *Riboflavin*. This vital substance in close relation with other enzyme systems takes part in carbohydrate and protein metabolism in hydrogen transfer as well as in oxidative processes.

The normal vision of the baby is promoted, his resistance to infection is heightened, and assistance to his growth and general health is contributed by adequate amounts of *Vitamin A*, while the correct potency of *Vitamin D* helps to regulate the *Calcium and Phosphorus metabolism*, thus enabling the child to build strong bones and teeth.

It will be seen, therefore, that the healthy development of a young child can only be expected if *a carefully selected and properly balanced food* containing ALL THE NEEDED NUTRITIVE ELEMENTS is given. Herein lie the true foundations of a sound metabolism, thus enabling the body to carry on its processes of breathing, excreting, playing, building and growing.

CLINICAL SAMPLES

Physicians are invited to write for clinical samples, as well as literature and feeding schedule.

The NUTRIM COMPANY Limited
TORONTO, ONT.

**The Foundations of Nutrition* by Mary Swartz Rose, p. 97. (MACMILLAN CO., New York)